

automatic samplers to comply with monitoring requirements. The liquid effluent from the SNL/CA sanitary sewer outfall is monitored for regulated physical parameters, metals, and EPA priority organic pollutants. The wastewater must comply with the site outfall discharge limits. Some slight exceedances have occurred, but these have had no impact on the receiving wastewater treatment plant (SNL 1996a, 1997a, 1998a, 1999a, 2000a).

Potable Water Use

SNL/CA purchases potable water from the adjacent LLNL. LLNL is supplied by the San Francisco Water District through the Hetch Hetchy Aqueduct. When needed, water is also supplied by the Alameda County Flood Control and Water Conservation District, Zone 7. The San Francisco Water District and Zone 7 are responsible for monitoring the quality of the incoming water. SNL/CA neither treats nor samples the drinking water. LLNL maintains the drinking water distribution system for both sites. Maintenance includes water quality screening analyses. In 2000, SNL/CA used approximately 53 million gallons (M gal).

4.6 BIOLOGICAL RESOURCES

4.6.1 DEFINITION OF RESOURCE

Biological resources at SNL/CA considered in this section are terrestrial resources, aquatic resources, wetlands, and protected and sensitive species.

4.6.2 REGION OF INFLUENCE

For biological resources, the affected environment consists of the plant and animal species within the boundaries of SNL/CA. Where appropriate, mention may be made of the proximity of protected or sensitive species that are not present at the site, but have been reported in the surrounding area.

4.6.3 AFFECTED ENVIRONMENT

4.6.3.1 Terrestrial Resources

Vegetation

SNL/CA is located on 410 acres, with approximately 130 acres currently developed for use as research facilities, offices, support facilities, roadways, and parking areas (SNL/CA 2002c). Undeveloped areas on the east, south, and west sides of the facility provide a security buffer zone and areas for future development. The following three terrestrial habitat areas have been identified in the undeveloped areas: grassland, coyote brush scrub, and riparian woodland (SNL/CA 2002b). The location of these habitats is presented in Figure 4-12.

Grasslands

Grasslands comprise 226 acres at SNL/CA and represent the predominant habitat in the open, undeveloped areas.

Although both native and nonnative species are present, nonnative species are dominant. Common nonnative grasses include ripgut brome (*Bromus diandrus*), soft chess (*B. hordeaceus*), wild oats (*Avena* sp.), and Mediterranean barley (*Hordeum marinum*). Common nonnative herbs include red maids (*Calandrinia ciliata*), bur clover (*Medicago polymorpha*), and cheeseweed (*Malva* sp.). Scattered patches or individual native wildflowers can be observed in the grassland habitat including Brodiaea (*Brodiaea* sp.), California poppy (*Escholzia californica*), blue dicks (*Dischlostemma capitatum*), and farewell to spring (*Clarkia purpurea*) (SNL/CA 2002b, SAIC 2001a).

Recent botanical surveys have confirmed the presence of mature valley oaks (*Quercus lobata*) in the grassland habitat, with many valley oak saplings identified on the east side of the site (SAIC 2001a). The locations of these sites are indicated in Figure 4-12 (SNL/CA 2002b). The presence of valley oak saplings at SNL/CA was considered noteworthy by the survey team. Several saplings that may be northern California black walnut (*Juglans californica hindsii*) were observed, but positive identification may not be possible for another several years (SAIC 2001a, SNL/CA 2002b).

Eleven invasive exotic plant species have been identified at SNL/CA: bindweed (*Convolvulus arvensis*), bull thistle (*Cirsium vulgare*), Italian thistle (*Carduus pycnocephala*), mayweed (*Anthemis cotula*), Mediterranean mustard (*Hirschfeldia incana*), medusa head (*Taeniatherum caput-medusae*), milk thistle (*Silybum marianum*), pampas grass (*Cortaderia* sp.), pepperweed (*Lepidium latifolium*), purple star thistle (*Centaurea clacitrapa*), and yellow star thistle (*Centaurea solstitialis*) (SNL/CA 2002b, SAIC 2001a).

Coyote Brush Scrub

Two small areas of coyote brush scrub occur onsite. One is in the southwest corner of SNL/CA and the second is near the Arroyo Seco on the eastern property boundary. The total coyote brush scrub habitat is approximately 1.5 acres in size. It is located in steep and generally inaccessible areas where disturbance from site activities would be unlikely (SNL/CA 2002b).

Riparian Woodland

At SNL/CA, willow riparian woodland of approximately 2.4 acres is present along the eastern portion of the Arroyo Seco. This habitat has increased from just a few isolated patches in 1975 to a more dense and uniform cover along the arroyo (SNL/CA 2002b). A recent survey determined that dominant species include Goodding's black willow (*Salix gooddingii*), arroyo willow (*Salix lasiolepis*), red willow (*Salix laevigata*), and narrow-leaved willow (*Salix exigua*). Other common plant species include Fremont cottonwood (*Populus fremontii*), western sycamore (*Platanus racemosa*), and valley oak. A few immature trees were tentatively identified as northern California black

walnut, although positive identification will not be possible for several years (SNL/CA 2002b, SAIC 2001a).

Wildlife

Wildlife species that have been recorded at SNL/CA include three amphibians, two reptiles, 58 birds, and 14 mammals. These animals have not been grouped by habitat, due to the relatively small size of the installation (0.64 square miles [sq mi] [1.66 square kilometers]) and mobile nature of most of the observed wildlife species (SNL/CA 2002b).

Two amphibians and two reptiles without *Endangered Species Act* (ESA) protection have been observed at SNL/CA. These include the western toad (*Bufo boreas*), Pacific chorus frog (*Pseudacris regilla*), western fence lizard (*Sceloporus occidentalis*), and gopher snake (*Pituophis melanoleucus*). An additional species not protected under the ESA, the California tiger salamander (*Ambystoma californiense*), has been observed at SNL/CA. Information on the California tiger salamander (*Ambystoma californiense*), a Federal candidate species, is provided in Section 4.6.3.4.

Birds are the most abundant group of vertebrates present at SNL/CA. Some of the bird species observed include the mallard (*Anas platyrhynchos*), American coot (*Fulica americana*), turkey vulture (*Cathartes aura*), American kestrel (*Falco sparverius*), mourning dove (*Zenaida macroura*), northern flicker (*Colaptes auratus*), American crow (*Corvus brachyrhynchos*), American robin (*Turdus migratorius*), red-winged blackbird (*Agelaius phoeniceus*), brown-headed cowbird (*Molothrus ater*), Brewer's blackbird (*Euphagus cyanocephalus*), white-crowned sparrow (*Zonotrichia leucophrys*), song sparrow (*Melospiza melodia*), house finch (*Carpodacus mexicanus*), lesser goldfinch (*Carduelis psaltria*), and European starling (*Sturnus vulgaris*). None of the observed species have protection under the ESA, although several are protected under the MBTA (see Section 4.6.3.4).

Common mammals that are not protected by the ESA include the fox squirrel (*Sciurus niger*), California ground squirrel (*Spermophilus beecheyii*), and feral cat (*Felis catus*). Additional mammals observed include the desert cottontail rabbit (*Sylvilagus audubonii*), black-tailed jack rabbit (*Lepus californicus*), coyote (*Canis latrans*), red fox (*Vulpes vulpes*), gray fox (*Urocyon cinereoargenteus*), striped skunk (*Mephitis mephitis*), and opossum (*Didelphis virginiana*). A complete list of wildlife species sighted at SNL/CA since 1994 is provided in the SNL/CA EID (SNL/CA 2002b).

4.6.3.2 Aquatic Resources

Aquatic habitat of about 2.7 acres is present at the LLNL recharge basin on SNL/CA land in the west buffer. The recharge basin consists of two cells (or percolation ponds) to which water can be discharged into one or both cells

simultaneously. Cattail (*Typha* sp.) and rush (*Juncus* sp.) are among the most common plant species in the recharge basin. Much of the vegetation is removed during annual summer maintenance by LLNL when the cells are drained, with plant growth generally returning the following spring (SNL/CA 2002b). A survey in 2001 did not detect any California red-legged frogs (*Rana aurora draytonii*) or California tiger salamanders (*Ambystoma californiense*), but confirmed that the ponds are suitable habitat for both species (see Section 4.6.3.4 for additional information on these two species).

4.6.3.3 Wetlands

Within the riparian woodland habitat are 0.44 acre of seasonal wetlands associated with Arroyo Seco, almost entirely in the east buffer zone. These delineated wetlands are present along 1,370 ft of the arroyo running from the eastern boundary to 200 ft east of the fence surrounding the developed part of the installation (SAIC 1998b). Along this portion of arroyo are a number of obligate (limited to certain conditions) wetland species including Goodding's black willow, willow dock (*Rumex salicifolius*), southern cattail (*Typha domingensis*), and water cress (*Rorippa nasturtium-aquaticum*). Facultative (capable of living under varying conditions) wetland species include arroyo willow, red willow, mugwort (*Artemisia douglasiana*), rush, rabbit's foot grass (*Polypogon monspeliensis*), stinging nettle, and nutsedge (*Cyperus eragrostis*). Pepperweed (*Lepidium latifolium*), an invasive exotic species, is also present (SNL/CA 2002b; SAIC 1998a, 2001a).

For a discussion on surface water (floodplains and wetlands), see Section 4.5.2.

4.6.3.4 Protected and Sensitive Species

Table 4-1 lists Federal and California species with protected or sensitive status that have been reported at or near SNL/CA.

The California red-legged frog (*Rana aurora draytonii*) is the only Federally threatened or endangered species that has been found in close proximity to SNL/CA. The California red-legged frog is known to occur at LLNL and in the farm stock pond on adjacent property on the east side of SNL/CA (SAIC 2001a). It was not sighted during a 2001 survey of the Arroyo Seco drainage and the recharge basin on the west side of the site. This survey concluded that although the recharge basin provides suitable habitat for part of the year, the irregular drainage during the breeding season of the California red-legged frog minimizes the use of this habitat on a year-round basis (SAIC 2001a).

The U.S. Fish and Wildlife Service (USFWS) has designated critical habitat for the California red-legged frog as shown in Figure 4-13 (66 FR 14626, SNL/CA 2002b).

Table 4-1. Federal and California Species With Protected or Sensitive Status Reported At or In the Vicinity of Sandia National Laboratories, California

Common & Scientific Names	Found Onsite ^a	Federal Status ^b	State Status ^b
Amphibians and Reptiles			
California Tiger Salamander (<i>Ambystoma californiense</i>)	Yes ^c	Candidate for listing	Species of special concern
California Red-legged Frog (<i>Rana aurora draytonii</i>)	No ^{d, e}	Threatened	
Alameda Whipsnake (<i>Masticophis lateralis euryxanthus</i>)	No ^d	Threatened	Threatened
Birds			
Western Burrowing Owl (<i>Athene cunicularia</i>)	Yes ^f	MBTA	Species of special concern
Loggerhead Shrike (<i>Lanius ludovicianus</i>)	Yes	MBTA	Species of special concern
White-tailed Kite (<i>Elanus leucurus</i>)	Yes ^f	MBTA	Fully protected
Golden Eagle (<i>Aquila chrysaetos</i>)	Yes	MBTA	Species of special concern
Northern Harrier (<i>Circus cyaneus</i>)	Yes	MBTA	Species of special concern
Cooper's Hawk (<i>Accipiter cooperii</i>)	Yes	MBTA	Species of special concern
Ferruginous Hawk (<i>Buteo regalis</i>)	Yes	MBTA	Species of special concern
Red-tailed hawk (<i>Buteo jamaicensis</i>)	Yes	MBTA	Species of special concern
Mammals			
San Joaquin Kit Fox (<i>Vulpes macrotis mutica</i>)	No	Endangered	Threatened
Mountain Lion (<i>Felis concolor californica</i>)	Yes	None	Special protected mammal

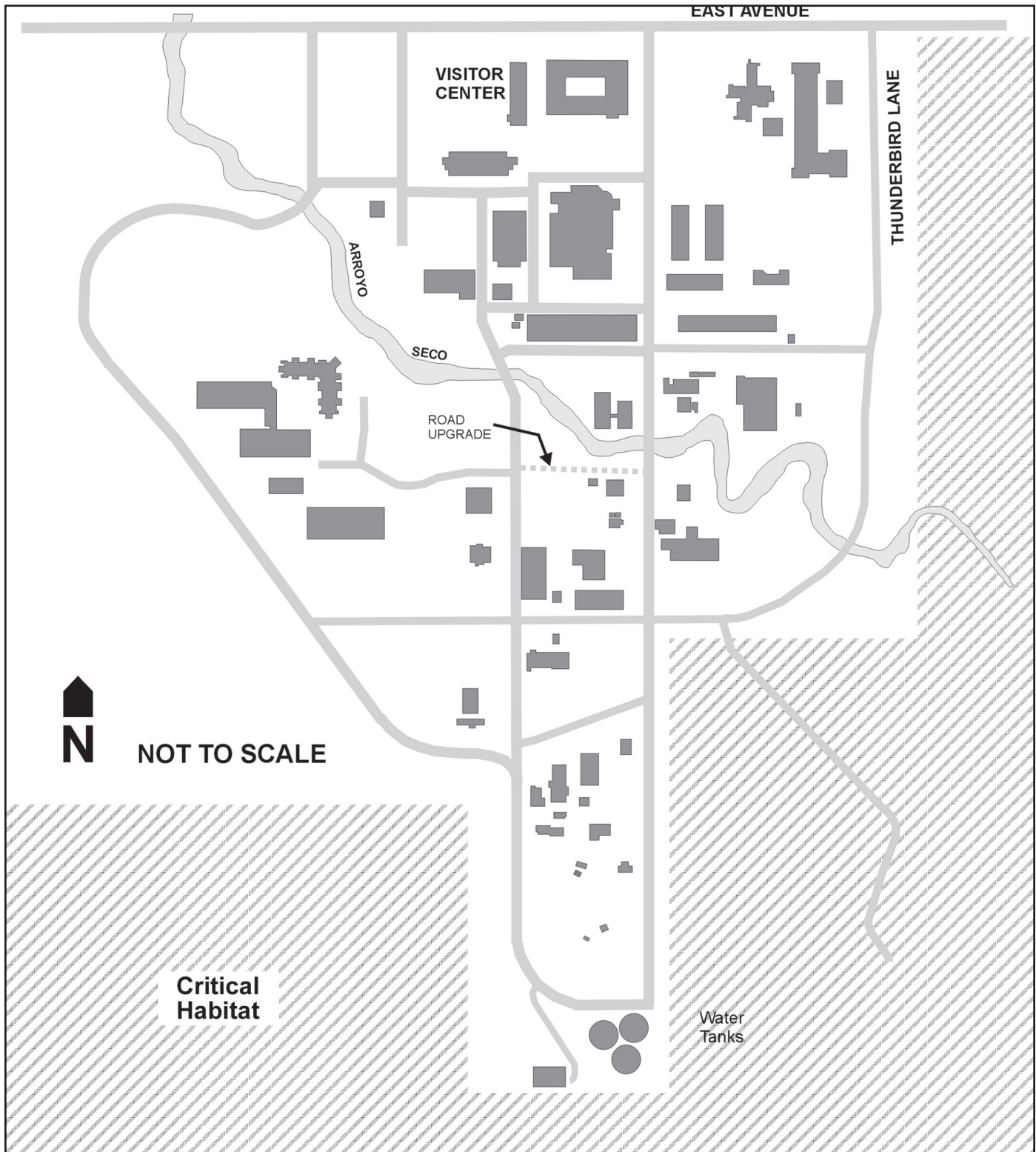
Source: SNL 2001e

MBTA: *Migratory Bird Treaty Act*^aOnsite observation records in the table were made between 1994 and 2001.^bSome species are protected by more than one regulation. Only the most commonly used are listed.^cThis species has previously been observed at SNL/CA, but was not detected during a 2001 protocol survey.^dThis species has not been seen at SNL/CA but is present in the vicinity.^ePortions of SNL/CA have been designated as critical habitat for the California red-legged frog.^fThis species has previously been observed at SNL/CA, but has not been sighted since 1997.

This habitat consists of the undeveloped portion of the east and south buffer zone (SNL/CA 2002a). A protocol survey in 2001 concluded that the Arroyo drainage is marginal habitat for year-round use by the California red-legged frog, but may serve as a travel corridor during the wet season (SAIC 2001a).

In 2001, a CDFG protocol survey was conducted for the San Joaquin Kit Fox (*Vulpes macrotis mutica*), a species with Federal endangered and California threatened status. The survey confirmed that this species is not present at SNL/CA (SAIC 2001a).

In August 2000, a habitat assessment was conducted at SNL/CA for the Alameda whipsnake (*Masticophis lateralis euryxanthus*), another species with Federally threatened status (Swaim 2000a). The investigation concluded that there is no suitable habitat present at SNL/CA for this species (Swaim 2000a, SNL/CA 2002b). The closest documented record of an Alameda whipsnake to SNL/CA appears to be approximately eight miles northwest of the site on Morgan Territory Road (Swaim 2000a). Although no critical habitat has been designated for the Alameda whipsnake at SNL/CA, critical habitat exists just to the south of the site (SNL/CA 2002b).



Source: SNL 2001d

Figure 4-13. Critical Habitat for California Red-legged Frog at Sandia National Laboratories, California

Species that are Federally proposed or candidates for listing as threatened or endangered do not receive legal protection under the ESA (42 U.S.C. §1531). Candidate species include those plants and animals for which the USFWS has on file sufficient information on biological

vulnerability and threat to support issuance of a proposed rule for listing as threatened or endangered. However, the USFWS encourages the consideration of impacts to these species in project planning since their status can be changed to threatened or endangered in the near future.

The California tiger salamander (*Ambystoma californiense*) is a Federal candidate species that does not receive protection under the ESA. However, the DOE implementing regulations require the consideration of candidate species during its NEPA process. In December 2001, the California Fish and Game Commission rejected a petition to list the California tiger salamander as an endangered species under the *California Endangered Species Act* (SNL/CA 2002b). The California tiger salamander has not been seen at SNL/CA in the last two years, although SNL/CA records indicate previous sightings at the recharge basin cells, at water towers, and at Post 15. The recharge basin cells and a farm pond on adjacent property just east of the site provide the most suitable habitat for the California tiger salamander as shown in Figure 4-11 (SNL/CA 2002b, c). A recent radio telemetry monitoring study indicated that California tiger salamanders do not travel more than about 560 ft from surface bodies of water and use mammal burrows such as those of the California ground squirrel (*Spermophilus beechii*) when away from breeding ponds (Trenham 2001, SNL/CA 2002b).

The USFWS species of concern category includes former Category 2 species (such as species possibly appropriate for listing). Species of concern is a term that describes many plants and animals whose conservation status may be of concern to the USFWS, but do not have official status. Two Federal species of concern have been observed at SNL/CA. Several pair of loggerhead shrikes (*Lanius ludovicianus*) were observed at SNL/CA in 2001, with nest locations shown in Figure 4-12 (SAIC 2001a). This bird has also been designated by California as a species of special concern (SNL 2001e). No evidence of the western burrowing owl (*Athene cunicularia*) was detected during a biological survey in 2001. This owl is also a California species of special concern. Two pairs of burrowing owls were observed at SNL/CA in 1995 near the percolation ponds and again in 1996 and 1997 (SAIC 2001a).

For the consultation procedures of the ESA and section 7(c) of the 1978 amendments, the DOE has compiled information on the California red-legged frog, designated critical habitat for the California red-legged frog, and the California tiger salamander to assess possible effects that the proposed action would have on these species and critical habitat. A biological assessment has been prepared and submitted to the USFWS.

A number of species in Table 4-1 receive protection under the *Migratory Bird Treaty Act* (16 *United States Code* [U.S.C.] § 703). The golden eagle, for example, which has been sighted as a transient over the site, is also afforded protection under the *Bald and Golden Eagle Protection Act* (16 U.S.C. § 668). The loggerhead shrike is the only bird species listed in Table 4-1 that is currently nesting at SNL/CA. The ferruginous hawk (*Buteo regalis*) and northern harrier (*Circus cyaneus*) have been occasionally observed at

SNL/CA since 1994 and may use the area for foraging (SAIC 2001a, SNL/CA 2002b).

4.7 CULTURAL RESOURCES

4.7.1 DEFINITION OF RESOURCE

Cultural resources are prehistoric or historic archaeological sites, buildings, structures, districts, objects, or places considered important to a culture or community. Cultural resources are those that have been recommended as or determined to be eligible or potentially eligible for inclusion in the National Register of Historic Places (NRHP), or are religious or sacred sites important to Native Americans.

In order to be included in the NRHP, a resource should retain most, if not all, of seven aspects of integrity: location, design, setting, workmanship, material, feeling, and association. Based on the standards of the National Park Service (NPS), the resource must meet a cutoff date of 50 years in age to be eligible, thereby allowing the historical perspective necessary to evaluate significance. Finally, a resource must meet one or more of the following criteria of importance (36 *Code of Federal Regulations* [CFR] Part 60):

Criterion A—Associated with events that have made a significant contribution to the broad patterns of our history.

Criterion B—Associated with the lives of persons significant in our past.

Criterion C—Embodies the distinctive characteristics of a type, period, or method of construction.

Criterion D—Yielded or may be likely to yield information important in prehistory or history.

4.7.2 REGION OF INFLUENCE

The ROI includes the entire SNL/CA site. The resources include those already identified, as well as those that have not yet been discovered, such as buried archaeological sites and unknown Native American resources. The site currently includes both built areas and undisturbed areas, and the area surrounding the site is a mix. Any changes in land use, such as construction of new buildings, would not change the visual characteristics of the area. Thus, there is no concern for visual impacts to nearby cultural resources and the ROI does not extend off the site.

4.7.3 AFFECTED ENVIRONMENT

4.7.3.1 Overview of Cultural Resource Studies and Results

SNL/CA has conducted two comprehensive studies of cultural resources on the site. In 1990, an assessment of